PRELIMINARY CLOSE OUT REPORT

SOUTH CAVALCADE
SUPERFUND SITE

Region 6

September 2000

PRELIMINARY CLOSE OUT REPORT
SOUTH CAVALCADE STREET SUPERFUND SITE
HOUSTON, TEXAS

I. INTRODUCTION

This Preliminary Close Out Report ("PCOR") documents that potentially responsible party (PRP) Beazer East, Inc. (referred to, hereafter, as Beazer or BEI) has completed construction activities for both the soil remedial action and the groundwater remedial action at the South Cavalcade Street Site in accordance with the U.S. Environmental Protection Agency (EPA) Office of Emergency and Remedial Response (OERR) *Close Out Procedures for National Priorities List Sites* OSWER Directive 9320.2-09A-P (Final, January 3, 2000). The U.S. Environmental Protection Agency (EPA) and the Texas Natural Resource Conservation Commission (TNRCC) conducted a final inspection on July 12, 2000, and determined that BEI has constructed the remedy in accordance with the remedial design (RD) plans and specifications, and the September1988 Record of Decision (ROD) and the June 1997 ROD Amendment. BEI has initiated activities necessary to achieve performance standards and site completion.

II. SUMMARY OF SITE CONDITIONS

Background

The South Cavalcade Site occupies approximately 66 acres of urban land located about three miles north of downtown Houston, Texas, and about one mile southwest of the intersection of interstate Loop 610 and U.S. Highway 59. It is bounded by Cavalcade Street to the north, Collingsworth Street to the south, and the Missouri and Pacific Railroad lines to the east and west. The Site is rectangular in shape with a length of approximately 3,400 feet (in the north-south direction) and a width of approximately 900 feet (in the east-west direction).

National Lumber and Creosoting Company acquired legal title to the Site in 1910 and constructed and operated a wood treating and coal tar distillation facility. National Lumber and Creosoting Company was acquired in 1938 by the Wood Preserving Corporation, a subsidiary of Koppers Company. In 1940, the Wood Preserving Corporation became a part of Koppers Company. In 1944, Koppers Company was incorporated and became Koppers Company, Inc., and continued the use of the Site as a wood preserving and coal tar distillation facility until 1962. Koppers, now known as Beazer East, Inc. (BEI or Beazer), operated the wood treating facility, located in the southern portion of the Site along Collingsworth Street, and the coal tar distillation plant, in the southeastern portion of the Site, until 1962. By 1964, the wood preserving and coal tar distillation facility had been demolished, the property sold and subdivided, and has since been occupied by several trucking firms.

In 1983, the Houston Metropolitan Transit Authority investigated the site for potential mass transit use and found evidence of buried creosote. The Texas Department of Water Resources (TDWR) conducted a further study and determined that the site could pose a threat to public heath and the environment. Based on this information, the TDWR referred the site to EPA for inclusion on the National Priorities List (NPL).

EPA proposed the South Cavalcade Site to the National Priorities List (NPL) on October 15, 1984 (49 FR 40320), and added the Site to the final list on June 10, 1986 (51 FR 21054).

In March 1985, Koppers entered into an Administrative Order on Consent (AOC) with EPA to conduct a Remedial Investigation/Feasibility Study (RI/FS) at the Site. The RI/FS was completed by Koppers in August 1988 with submittal of the *Remedial Investigation Report* and the *Feasibility Study Report* to EPA. The RI identified two primary areas of potential creosote impact in the surficial soil, defined as surface to six feet below grade: one area in the southern portion, corresponding to the former locations of the coal tar plant and wood treating operations; and one area in the northern portion, corresponding to a pond observed in a 1964 aerial photo of the site. Total surficial soil polynuclear aromatic hydrocarbons (PAHs) ranged from below detection levels to 8567 mg/kg. Contaminants of concern released to soil were benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene. Copper, chromium, arsenic, zinc, and lead were also present in concentrations exceeding background.

The RI also indicated that PAHs, from below detection limits to observed non-aqueous phase creosote at several wells, were present in the shallow aquifer underlying the Site, at 6 to 10 feet below the surface. Metals, including arsenic, chromium, copper, lead, zinc, and aromatic volatile organics, specifically benzene, toluene, ethylbenzene, and xylene, were also detected. PAHs were not detected in the deeper aquifer, located at depths 175-205 feet below surface. An evaluation of groundwater use in the vicinity of the Site confirmed that there was no use of the shallow groundwater within a one-mile radius of the Site. Although, the deeper aquifer is potentially useable as a public water supply source, on-site and neighboring residents are all served by the City water supply which originates from a deeper aquifer 10 miles from the site, or a surface water reservoir located over 20 miles from the site.

The property is currently being used for freight truck terminals; this is not expected to change in the foreseeable future. EPA does not anticipate population growth in those areas surrounding the Site because this area of Houston is "built out," indicating that growth has probably peaked. Access from two major freeways, IH610 and U.S. Highway 59, make this Site ideal for continued trucking terminal operations. The Site's location within an existing industrial corridor, bordered by railroad tracks and next door to a fuel distributor, as well as a meat rendering plant, most likely will ensure that the Site will remain industrial. Lastly, an administrative order, entered into with EPA and the landowners, provides an institutional control to discourage residential land use. Under the order, the landowners were required to file a notice in the land records of Harris County, within 60 days of the effective date. The order specified that "hazardous substances were disposed of and will continue to remain in both the soils and ground water at the Site," and included language that "development of the Site for residential use is inappropriate due to the continuing presence of hazardous substances at the Site." In addition, copies of the Consent Decree and Consent Order between EPA and Beazer East, Inc., were included with the notice, and will be attached to future land transactions. The responsibility to provide appropriate notice to future purchasers rests with the landowners. Penalties for failure to do so are stipulated in the Administrative Order, effective January 24, 1992.

Remedy Selection

On September 26, 1988, the Regional Administrator signed a Record of Decision (ROD) for the South Cavalcade Site, selecting methods of remediation for both soil and ground water. Two methods were proposed for approximately 30,000 cu. yd. of contaminated soils at the Site: soil flushing and soil

washing. Each option for ground water remediation included provisions for long-term ground water monitoring, ground water extraction, treatment, and re-injection, and collection of non-aqueous phase liquids (NAPL) for an estimated 50 million gallons of ground water. The ROD selected a ground water treatment option which included a chemical/physical separation of the dense non-aqueous phase liquids (DNAPL), followed by filtration to remove metals and solids, and treatment of the effluent by carbon adsorption. Treated effluent would be re-injected, with excess discharged to an adjacent drainage ditch and into Hunting Bayou in accordance with a National Pollutant Discharge Elimination System (NPDES) permit. The ROD specified that ground water be treated at an onsite wastewater treatment plant to levels equal to Maximum Contaminant Levels and no detectable carcinogenic PAHs. The ROD also allowed for an alternate remediation plan if a potentially responsible party could show that in situ biological treatment of soil and ground water would provide equal or better performance to the remediation alternatives outlined in this decision.

Although the ROD presented the selected remedial alternatives for both surface/surficial soil and ground water, separate operable units were not designated. Risk-based remedial goals were specified for surface/surficial soils as 700 ppm for carcinogenic PAHs, based on ingestion and direct contact. For further ground water protection, the ROD also provided for a leaching potential-based goal for soil, specifically the EPA Toxicity Characteristic Leaching Procedure (TCLP). Ground water extraction, treatment, and reinjection back into the aquifer would continue until the ground water contaminants were recovered to the "maximum extent possible." This point would be determined during Remedial Action (RA) based on the operation of the collection and treatment system, and considering remedial goals which are as close to the drinking water standards, and no detectable carcinogenic PAHs, to the "maximum extent possible." After this point is reached, ground water collection would cease and remaining residuals would be allowed to naturally attenuate to background levels. [Note: The criteria to determine if the ground water has been remediated to the "maximum extent possible" is outlined in the *Groundwater Extraction System Performance Monitoring Plan* (GESPMP), included in the May 1995 *Remedial Action Work Plan* (RAWP), as amended November 8, 1999.]

Under a Consent Decree, executed March 14, 1991, Beazer agreed to implement the final plan for remedial action selected by EPA, as presented in the ROD.

In September 1992, a Keystone Environmental *Soil Delineation Report* demonstrated that the estimated soil quantity requiring remediation was significantly less that the 1988 ROD estimate, and supported one soil remedy in lieu of two. EPA concurred that Beazer proceed with soil washing as the remedy. In 1993, during the design effort, BEI conducted a soil washing pilot study. The results of this study demonstrated that 40 percent of the soil volume could not be washed to meet the remedial goal. Consequently, the final volume of soil that would remain contaminated was uncertain. These pilot study findings presented new information that fundamentally changed the performance and cost of the selected remedy.

BEI submitted a proposal to contain waste at the site, and as a result, EPA re-evaluated the reasonably anticipated industrial land use and potential exposure pathways for that use. EPA concluded that a reinforced concrete cap would provide a reliable long-term barrier against direct contact exposure with the contaminated soil and provide an impermeable barrier to rainfall infiltration, eliminating an exposure pathway to ground water. An Administrative Order on Consent, entered in 1992, further required each landowner to deed notice future owners that contamination remained on site. The order also prevented landowners from drilling water wells on sites; required that landowners maintain

foundations and paved areas, including the cap; and provided notice that residential use of the property is inappropriate due to the continuing presence of hazardous substances in soils and ground water at the Site.

On June 26, 1997, the Regional Administrator signed an Amended Record of Decision to allow for a remedy to seal and contain soils contaminated with greater than 700 ppm carcinogenic polynuclear aromatic hydrocarbons (PAHs) beneath a six inch thick reinforced concrete cap. The amended ROD was applicable to soils only; the ground water remedy selected under the 1988 ROD remained unchanged.

Remedial Construction Activities - Ground Water

On March 14, 1991, Beazer entered into a Consent Decree with EPA for implementation of the remedial design and remedial action for the Site. The proposed plan for completion of the remedial design process, including pre-design and pilot studies, was presented to EPA in March 1992, as the *Remedial Design Work Plan* (RDWP). Beazer completed pilot study construction tasks in October 1993 to support the groundwater remedial design, including the Ground Water Pilot Collection Trench and the Ground Water Pilot Treatment Plant. The *100% Remedial Design for the Ground Water Collection and Reinjection System and DNAPL Recovery System* for the Site was approved by EPA in December 1994. Following approval of the remedial designs, Beazer prepared the *Remedial Action Work Plan* (RAWP), dated May 10, 1995, which presented the procedures and requirements for construction of the remedial alternatives. The RAWP was approved by EPA in May 1995; construction for the ground water remedial action was initiated in June 1995. The RAWP was revised to include the final *Operations and Maintenance Manual* for the ground water collection system, and was approved again in November 1999. The following groundwater Remedial Actions (RA) were completed according to the ROD specifications, approved Remedial Design documents, and approved RAWP:

- Installation of 11 recovery wells. One DNAPL recovery well (RWN-4) and four ground water collection wells (RWN-1, RWN-2, RWN-3 and RWN-5) were installed within Ground Water Remedial Action Area (GRAA) 1 located in the northern section of the Site. One DNAPL recovery well (RWS-5) and three groundwater collection wells (RWS-3, RWS-4, and RWS-6) were installed within GRAA 2, which includes the area formerly occupied by the coal tar distillation plant. Two combined groundwater collection/DNAPL recovery wells (RWS-1 and RWS-2) were installed within GRAA 3, which includes the area formerly occupied by the wood treating process area;

- Installation of 22 piezometers, as part of the groundwater remedial action;

- Construction of the Groundwater Treatment Plant (GWTP).

Start-up of the ground water collection and NAPL recovery components of the ground water remedy was conducted in September 1995, following completion of the ground water treatment plant modifications.

In a July 31, 1995, *Memorandum from Elliot Laws, Assistant Administrator, to Regional Administrators Region I-X Regarding Superfund Groundwater RODs: Implementing Change This Fiscal Year*, EPA issued new guidance favoring applicable and relevant and appropriate requirement (ARAR) waivers at sites where it is technically impracticable to remediate ground water to Federal or State

standards. The memorandum spoke to those sites where dense non-aqueous phase liquids exist, warranting "a flexible phase approach to ground water remediation such as used in interim RODs, no action alternatives, natural attenuation, Technical Impracticability (TI) waivers, etc." In October 1995, EPA indicated that there was some question as to whether the remedial action goals specified in the 1988 ROD would continue to be applied, within the framework of that guidance. At that time, EPA and Beazer agreed to delay general ground water collection and treatment pending consideration of ground water fate and transport information, with the understanding that DNAPL collection and treatment would continue to further remove the contaminant source and contain the plume.

In August 1997, Beazer issued a *Ground Water Fate and Transport Evaluation Report* to assess whether natural processes (e.g. adsorption, dispersion and biodegradation) would be effective in reducing concentrations of dissolved phase constituents to health-protective levels before ground water migrates to locations where exposure to ground water could reasonably occur. The report provided a preliminary indication that natural attenuation of dissolved organic constituents of interest may be occurring in the shallow ground water and recommended additional investigation to verify those findings. A *Work Plan* for the further investigation was issued in August 1998, and specified the collection of additional ground water samples and data analysis to evaluate the potential for natural attenuation of dissolved constituents in ground water. EPA and TNRCC recently received the information from the additional investigations (*Ground Water Fate and Transport Evaluation Report, July 2000*) and are currently reviewing the material.

This re-evaluation of remedial goals is in keeping with the 1988 ROD language which allows for in situ biological treatment of soil or ground water if equal or better performance can be demonstrated. The ROD further allows for the determination of "maximum extent possible" remediation goals during the RA phase.

The DNAPL recovery system has been in operation since January 1996, and is currently ongoing in all three Ground Water Remedial Action Areas (GRAAs). Ground water extraction is being used in all three zones to further enhance DNAPL recovery. The recovery system is meeting EPA's expectations for continued source removal and containment. To date, approximately 2000 gallons of DNAPL have been removed from the shallow water-bearing zone. In addition to the ongoing DNAPL recovery, Beazer has been conducting annual ground water monitoring in two deep ground water wells since March 1993. Monitoring results have confirmed that the deeper ground water has not been impacted by site-related activities. The 1988 ROD specifies that ground water monitoring will continue for at least 30 years unless it can be demonstrated during RA that a shorter interval is appropriate.

Remedial Construction Activities - Soils

EPA and Beazer agreed to amend the March 1991 Consent Decree to implement the modified soil remedy, set forth in the June 1997 ROD amendment. That modified soil remedy specified that contaminated soils be capped with reinforced concrete to achieve protection of human health and the environment. The amended Consent Decree, entered on February 25, 1999, included direction to Beazer to implement Remedial Design, Remedial Action, and Operation and Maintenance of the modified soil remedy. The RAWP, revised for the modified soil remedy on November 8, 1999, and the Soil Concrete Cap Design were approved by the EPA in November 1999. Concrete cap construction activities were initiated on November 26, 1999.

The following soil RAs were completed according to the amended ROD specifications, approved Remedial Design documents, and revised RAWP:

- Delineation of impacted soils at the site;

- Installation of a reinforced concrete cap system to cover impacted as well as non-impacted areas in the Southeast (10 inches thick) and the Southwest Areas (8 inches thick), therein providing usable parking and driveway systems for the current property owners;

- Excavation of soils in the Northeast Area to be used, along with existing on-site stockpiled materials, as fill under the concrete cap structures in the Southeast and Southwest Areas. The Northeast Area will then be backfilled with clean imported fill from an off-site source;

- Cap to provide a positive drainage system, eliminating standing rainwater, and to cover all of the presently known impacted soil surfaces. Provisions for storm water drainage and collection were provided in the design, and included the construction of a below-grade detention basin to comply with the City of Houston's permitting requirement.

Construction of the reinforced cap was completed in July 2000. The final inspection on July 12, 2000, determined that BEI had constructed the soil and ground water remedies in accordance with the remedial design (RD) plans and specifications, and the September 1988 Record of Decision (ROD) and the June 1997 ROD Amendment. Responsibilities for maintenance of the treatment facilities and concrete cap are defined in the amended 1999 RAWP, Section 7.0, and are as follows:

- Property owners will inspect and repair cracks and joint systems as necessary to maintain the structural integrity of the paving system; indications of deterioration will be reported.

- Beazer will perform an annual inspection to ensure that Long Term Operation & Maintenance activities for the cap are carried out and will submit an annual report to summarize their findings.

Beazer will be responsible for the maintenance of the ground water recovery and treatment systems until final remedial objectives are met.

III. DEMONSTRATION OF CLEANUP ACTIVITY QUALITY ASSURANCE AND QUALITY CONTROL

EPA and the TNRCC reviewed the remedial action construction for compliance with quality assurance and quality control (QA/QC) protocols. Construction activities at the site were consistent with the 1988 ROD, the amended 1997 ROD, the 1995 (rev. 1999) Remedial Action Work Plan (RAWP), and the Remedial Design (RD). The RAWP includes the EPA-approved 1991 *Quality Assurance Project Plan* (QAPP), which specifies all applicable EPA and State quality assurance and quality control (QA/QC) procedures for analytical methods for confirmatory and monitoring data. Protocols for waste management are also included in the RAWP. Criteria for ground water monitoring and data collection were further defined in the *May 1998 Operations and Maintenance Manual* developed by RETEC North Carolina, Inc. for Beazer East, Inc. Sampling and lab procedures were consistent with EPA methodology under the SW-846 methods.

The construction contractor for Beazer East, Inc., Bay Environmental, Ltd., adhered to the approved *Construction Quality Assurance Project Plan (CAQPP) [for] South Cavalcade Superfund Site, Houston, Texas, for Beazer East, Inc.*, May 1995. The CQAPP incorporated all EPA and State requirements. All confirmatory inspections, testing, audits, and evaluation of materials were performed in accordance with construction specifications of the CQAPP and the QAPP. The EPA and TRNCC project managers periodically visited the site during construction phases, and participated in weekly conference calls for status updates and discussions of any construction modifications. The CAQPP is included as an appendix in the RAWP.

IV. ACTIVITIES AND SCHEDULE FOR SITE COMPLETION

The RA activities that remain to be completed for the South Cavalcade Street Site include implementation of the Operations & Maintenance (O & M) Plan, reconsideration of ground water remedial objectives during the RA phase, completion of the Interim RA Report for soils (capping and containment), and the Operational and Functional (O&F) determination for ground water. Final actions, with target dates listed as "To Be Determined," are contingent on establishing final remedial goals and long-term monitoring requirements. Tasks and targets are outlined as follows:

Task	Target Date for Receipt /Completion	Responsible Organization
Draft First 5-Year Review	6/1/2000	EPA/Beazer
Implement O & M Plan (Soils)	7/12/00	Beazer/Landowners
Submit Interim RA Report	8/28/00	Beazer
Interim RA Report Concurrence (Soils)/Construction Complete (Ground Water)	9/30/00	EPA/TNRCC
Final First 5-Year Review	10/15/00	EPA/TNRCC
Review of GW Fate and Transport Evaluation	10/15/00	EPA/TNRCC/Beazer
O & F Determination	6/20/01	EPA/TNRCC/Beazer
Interim RA Submittal (Ground Water)	6/20/01	Beazer
Submit Long Term O & M Plan (Ground Water)	6/20/01	Beazer
Approve Long Term O & M Plan (GW)	7/20/01	EPA/TNRCC
Interim RA Report Concurrence (Ground Water)	7/20/01	EPA/TNRCC
Implement O & M Plan (Ground Water)	8/20/01	Beazer
Second Five-year Review	6/1/2005	EPA
Operation of DNAPL Recovery System	To Be Determined	Beazer
Post Remedial Groundwater Monitoring	To Be Determined	Beazer
Complete Facility Demobilization	To Be Determined	Beazer
Complete Demobilization Inspection	To Be Determined	EPA/TNRCC/Beazer
Approve Final RA Report	To Be Determined	EPA/TNRCC/Beazer
Approve Final Close Out Report	To Be Determined	EPA

V. SUMMARY OF REMEDIATION COSTS

The South Cavalcade Site is a PRP-lead Site; final costs were not submitted. However, original cost estimates to implement the remedial action were provided in the September 1988 ROD:

- Carbon Adsorption and Filtration (Ground Water): $3,800,000 capital; $482,000 for annual O & M; $8,300,000 present worth; 30 years of operation;

- Excavation and On-site Soil Washing (Soils): $10,000,000 capital and present worth; no O & M required; 5 years to complete; and

- In Situ Soil Flushing (Soils): $483,000 capital; $5,000 annual O & M; $530,000 present worth; 5-10 years to complete.

On-site soil washing and in-situ soil flushing were not implemented. Costs are provided for information only. The June 1997 amended ROD proposed capping in lieu of soil washing/in-situ soil flushing, and estimated costs at:

- Concrete Capping (Soils): $697,000 (net present worth); no O & M costs projected.

The reinforced concrete cap will also serve as truck terminal pavement. No O & M costs were factored into the estimate; maintenance of the concrete cap will be included in what would normally be required for terminal operations.

VI. FIVE-YEAR REVIEW

Hazardous substances will remain at the Site above levels that allow unlimited use and unrestricted exposure after the completion of the remedial action. Pursuant to CERCLA Section 121(c) and as provided in the current guidance on Five Year Reviews: OSWER Directive 9355.7-02, *Structure and Components of Five-Year Reviews* (May 23, 1991), OSWER Directive 9355.7-02A, *Supplemental Five-Year Review Guidance* (July 26, 1994), and OSWER Directive 9355.7-03A, the *Second Supplemental Five-Year Review Guidance* (December 21, 1995), OSWER Directive 9355.7-03B-P, the *Draft Comprehensive Five-Year review Guidance* (October 1999), EPA must conduct a statutory five-year review. The first *Five-Year Review Report (Draft)* was completed in June 2000 (five years after RA onsite mobilization); completion of the *Final* report is targeted for October 2000.

Approved By:

Myron O. Knudson

Myron O. Knudson, P.E.
Director
Superfund Division

9/15/00
Date

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